4-2010

The Dissociation Approach and Associations to Visual Stimuli and Their Impact on Information Processing

Virginia Burk
College of William and Mary

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A thesis submitted in partial fulfillment of the requirement
for the degree of Bachelors of Science in the Department of Psychology from
The College of William and Mary

By Virginia Burk

Accepted for _____
(Honors, High Honors, Highest Honors)

_____
Glenn D. Shean, Ph.D., Director

_____
Paul D. Kieffaber, Ph.D.

_____
Leisa Meyer, Ph.D.

Williamsburg, VA

April 21, 2010

Abstract

The area of dissociation has many competitive theories. The relationship of dissociation and magical thinking is of much interest. If dissociation causes magical thinking, it could lead to an elimination of many dissociative disorders from the study of psychology. In this study, emotional and neutral stimuli were shown to 62 females and 31 males. The participants were separated into high magical thinking and low magical thinking groups. After the stimulus was shown, the participants completed a simple cognitive task which recorded the time between the beginning and end of movement (AT), the time between the beginning of stimulus and the beginning of movement (AD) and the total time (RT). Each participant filled out a Dissociative Experiences Scale, a Magical Ideation Scale, and a Creative Experiences Questionnaire. No significant results were found between the scales and response times; however a gender difference was discovered for AD and AT scores. The difference score for AD when looking at the emotional stimuli (found by subtracting the Neutral score from the Emotional score) showed a significant difference when compared to the Neutral scores. Males took a shorter time to respond (Mean = -20.81, SD = 85.71) than females: (Mean of 51.42; SD = 146.66; $F(1, 92) = 6.40$, $p < .01$). A similar gender difference was discovered for AT, showing males having a faster AT response to emotional stimuli, but a slower one to neutral, and females having the opposite effect. This could mean that males and females process emotional stimuli differently, perhaps due to a difference in the way males and females process emotions or due to societal pressures for females to be more emotional than males.

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Dissociation is a complex idea. At its most innocent, it can be zoning out when walking and suddenly realizing you are at your destination. At its most malevolent, it can cause you to forget who your family is, who your loved ones are, and who you are. The study of dissociation, its causes and its warning signs is becoming more and more popular. Yet, there is still an immense amount that is unknown about this strange occurrence.

Dissociation is defined as the lack of normal integration of thoughts, feelings, and experiences into consciousness and memory (Giesbrecht, Lynn, Lilienfeld & Merckelbach, 2008), and usually occurs after exposure to a negative emotional stimulus (Forrest, 2001). Dissociation and fantasy proneness have been shown to be related through numerous studies (Merckelbach, Muris & Rassin, 1999; Merckelbach, Muris, Horselenberg & Stougie, 1999; Waldo & Merritt, 2000; Merckelbach & Giesbrecht, 2006; Giesbrecht, Merckelbach, Kater & Fetsje Sluis, 2007). This is thought to be because of a relationship between dissociation and schizotypy; those who score high on the Dissociative Experiences Scale (DES) tended to correlate significantly with those with high schizotypy scores (Merckelbach & Giesbrecht, 2006). Individuals who score high on questionnaire measures of dissociation and schizotypy also tend to score high on fantasy proneness, which appears to support the correlations between dissociation and fantasy proneness (Giesbrecht, Merckelbach, Katar & Fetsje Sluis, 2007). Individuals who are high on creative imagination and fantasy proneness, are faster and more accurate at discerning information with emotional content (Merckelbach, Horselenberg & Muris, 2001; Oathes & Ray, 2008). Thus, it is reasonable to predict that those who score high on fantasy proneness scales, such as the Creative Experiences Questionnaire (CEQ), and the Magical

Ideation Scale (MIS), should respond more quickly and process information more efficiently immediately following exposure to stimuli that include emotional content.

This research was designed to test the hypothesis that exposure to stimuli that depict negative experiences will trigger mild levels of affect that will increase efficiency of cognitive processing, as indicated by speed and accuracy of responses, on a simple information processing task. Processing efficiency is hypothesized to be positively associated with sub-clinical threshold scores on questionnaire measures of both fantasy proneness and self reported dissociative experiences.

Creative Experiences Questionnaire

This experiment will be used to test the hypothesis that those who score higher on the Creative Experiences Questionnaire will have faster response times when exposed to emotional stimuli. The CEQ has been used to measure schizotypy, and is also considered to be a valid and reliable measure of fantasy proneness (Giesbrecht, Merckelbach, Katar & Fetsje Sluis, 2007; van der Boom, van den Hout & Huntjens, 2010). The reliability and validity of schizotypal fantasy proneness are paramount in determining whether fantasy proneness and dissociation are related. However, what the relationship would mean is still a controversy in field of psychology.

The belief that those who are more creative react more quickly is supported by a study by Rothenberg and Burkhardt (1984). Three groups were compared, a creative group, a depressive group and a schizophrenic group. The creative group reacted significantly faster on the mean response times than the other two groups. However, since there was no control group, more information will be needed. Also, the creative group was composed by significantly older, Nobel Prize laureates which may have confounded the results. Thus, an experiment comparing creative participants to a control group is needed.

Creativity has interesting implications for time in general. Studies have shown that people with high creativity are more likely to have high perceived control of time and a higher likelihood to plan their behavior (Zampetakis, Bouranta & Moustakis, 2010). It is possible that the quicker response times shown in other studies are in part due to the control over time that those who score high on creative measures have.

Creative people are also drawn to jobs that involve risk taking (Devantier & Turkington, 2006). In a study involving one of these creative and risky jobs, emergency responders, Bastian (2009) studies the use of creativity. Emergency responders must use their creativity each time they enter a novel situation. Speed and response time is paramount to their occupations. If they react too slowly, lives could be lost. Not only must they be quick at repetitive tasks, but they must be quick responders to new information, new situations, and new problems. Also, because the job is risk oriented, novel emotional stimuli occur at each incident. Emergency responders must react quicker to emotional stimuli than to neutral stimuli in order to save lives. Thus, it is possible that creative people are drawn to occupations that involve quick response times to emotional stimuli.

However, other research contradicts findings of a correlation between creative thinking and dissociation (Cima, Merckelbach, Klein, Shellbach-Matties, & Kremer, 2001). Bremner (2010) commented on how many of the arguments claiming that creative thinking and dissociation are related use the CEQ as proof, but neglect to mention that many questions such as "I sometimes feel that I have an out of body experience" overlap with DES items, such as "feeling as though one's body is not one's own." This criticism will be taken into account during the experiment by correlating scales together and using the Magical Ideation Scale as well as the CEQ. Linear regression takes into account the correlations between scales when all are entered

into the same equation, so the assumptions of the test are not violated.

Magical Ideation Scale

The second hypothesis is that those who are high in magical ideation will react faster than the mean when presented with emotional stimuli. Also, it is believed that the Magical Ideation Scale and the Creative Experiences Questionnaire will be highly correlated since the MIS is being used as an alternative scale that provides a reliable and valid scale for measuring schizotypy (Simeon, Guralnik, Knutelska, & Nelson, 2004).

Participants with high schizotypy scores have been shown to respond more quickly when presented with emotional stimuli (Oathes & Ray, 2008). Additionally, there is a correlation between dissociation and magical thinking (Giesbrecht, Merckelbach, Katar & Fetsje Sluis, 2007). Since magical thinking and dissociation have been shown to be related to faster response times when viewing emotional stimuli (Forrest, 2001; Merckelbach, Horselenberg & Muris, 2001), there is reason to believe that scoring high on the MIS would predict quicker response times on the cognitive tasks.

When it comes to the MIS, there are conflicting studies. Gooding, Matts, and Rollmann (2006) found that, compared to controls, those who scored high on the Magical Ideation Scale performed more poorly with attention tasks and had poorer discrimination abilities. However, when just comparing raw response times, there was no difference between the groups. This study shows that more research is needed to pinpoint what type of responses are impacted by magical thinking. Another study adds to this, by finding that those who score high on the MIS display poorer performance on a Wisconsin Card Sorting Test (Tallent & Gooding, 1999). On the working memory task, high magical ideation participants scored significantly poorer than the control group. However, like the other study, raw reaction time was not impacted. Also not

impacted were sensorimotor and degraded stimulus control tasks. There are studies that have found slow reaction times (Hazlett, Dawson, Filion, Schell & Nuechterlein, 1997). When compared to a control group, those who scored high on magical ideation showed a slowed secondary reaction time. However, the study concluded that this heightened response time was due to attention deficits, which fits in with the conclusions of the other studies.

People who score high on the MIS also have a tendency to process emotions differently (Stuart, 2008). High magical thinkers and a control group were videotaped while watching emotional films. Participants had their facial expressions observed and were asked to complete a self-report questionnaires at the end of the film. Compared to the control group, participants who scored high on the MIS had decreased emotional expressivity. People with high scores on the MIS also complained more than the control group about somatic symptoms. The control group was significantly more likely to outwardly express emotions. There were no differences on facial expressions or emotions during the film. Another study looked at the emotions of high magical ideation participants. In a study by Kerns (2005), those who scored high on the MIS reported greater attention to emotions, less emotional clarity, and a higher likelihood of becoming emotionally overwhelmed. When it came to responses, high MIS participants showed absent affective priming, increased errors, and increased memory response bias for negative words.

These studies show conflicting evidence on whether high MIS participants would react quicker to emotional stimuli. However, the evidence seems to point to either quicker responses or no change. If the MIS is correlated with the CEQ, it seems more likely that response times would decrease when shown emotional stimuli.

Dissociative Experiences Scale

The third hypothesis is that those who score high on the Dissociative Experiences Scale will react quicker to emotional stimuli. However, there is intense debate about the relationship between emotional stimuli, such as trauma memories, and dissociation. This debate has deep historical roots. The postulated causes of dissociation or the predisposition toward dissociation have changed significantly over the years. In the early 1900s, studies linked dissociation proneness to trauma exposure (Jones, 1913; Schwab, 1919). Recently this view has been revived by clinical researchers (Putnam, 1997). In a study by Davidson et. al. (2009) it was shown that people who had a history of exposure to trauma had higher levels of dissociative symptoms than patients without such exposure. Evidence has also been reported that dissociation has an impact on efficient neurological function (Forrest, 2001). Though there is much research supporting the trauma view, there are other opinions that could impact this approach.

Some researchers have suggested that fantasy proneness causes false memories, and thus dissociation causes trauma rather than the other way around (Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2010). For example, in a study performed by Ost, Granhag, Udell, and Roos af Hjelmsäter (2008), 150 Swedish and 150 British participants recorded their memory of the Number 30 bus explosion in London. Those who were British and saw more media about the Number 30 bus explosion developed false memories and scored higher on measures of dissociation and fantasy proneness than the Swedish who did not develop false memories and who were not exposed to media.

Yet, the bulk of existing clinical research indicates that trauma causes dissociation, rather than dissociation causing trauma. For example, a study by Geraerts, Merckelbach, Jelicic, Smeets, and van Heerden (2006) included females who had repressed, recovered, and continuous memories of childhood sexual abuse and compared them to a control group. Childhood trauma,

dissociation and fantasy proneness were measured. Females who reported repressed, recovered memories scored higher on dissociation. In fact, all females who had repressed, recovered or continuous memories had higher fantasy proneness levels. If fantasy proneness was what "caused" dissociation in trauma victims, the researchers argued, dissociation would have been present in those experiencing continuous memories as well.

There is less debate about severe dissociation, like that of Dissociative Identity Disorder (DID), and its traumatic causes[1]. Some examples of studies that show this are: Boysan, Goldsmith, Cavus, Kayri & Keskin, 2009, Thomson, Keehn & Gumpel, 2009, Bremner, 2010, van der Boom, van den Hout & Huntjens, 2010. This suggests that the hypothesized relationship between dissociation and faster responses after viewing emotional material is counterintuitive, since emotional content may trigger dissociative processes and result in more problematic processing and slower responses. Findings from Elsesser, Freyth, Lohrmann, and Sartory (2008) seem to support the thought that dissociation would slow down response times:

> The results indicate that [Acute Stress Disorder] patients with elevated dissociative symptoms showed reduced eye-blink startle responses and their accelerated habituation. This correlation with reduced startle responses appears to support the suggestion that peritraumatic dissociations are part of a protective mechanism in response to threatening stimuli or, alternatively, that dissociation are a freezing-like adaptive response to stress. (p. 192)

According to the clinical definition of dissociation, the person experiencing this defensive process should evidence confused, and consequently slowed reactions, in response to potentially stressful emotional stimuli (American Psychiatric Association, 2000). Emotions beyond the normal range are not generally conducive to improved cognitive functioning, or to faster, more

[1] There are furious debates about DID, but it is over whether or not it exists. Once you get past that debate, those who believe it exists are fairly certain on its causes.

accurate cognitive processing. In contrast, exposure to emotional stimuli should contribute to varying degrees of cognitive slippage (Merckelbach, Horselenberg and Muris, 2001).

Most recent studies accept that high proneness to dissociation is related to prior exposure to significant emotional distress and that dissociation has an effect on cognitive functioning. This suggests that persons who score high on magical ideation and creative thinking are also likely to be somewhat more prone to dissociation. Consequently one can predict that exposure to stimuli that may trigger mild levels of emotional distress will interfere with efficiency and speed of cognitive processing as measured on a Wisconsin card sort type task. Existing evidence suggests that the impact that trauma and dissociation have on cognitive deficits seems to be primarily related to memory retrieval. Evidence is available suggesting that cognitive functions such as attention, working memory maintenance and updating, and set switching are amplified in those suffering from dissociation (Bremner, 2010).

Post Traumatic Stress Disorder (PTSD) is a trauma based disorder. Marshall and Schell (2002) and Cardeña and Weiner (2004) have pointed out that PTSD is also associated with dissociative symptoms and hyper-arousal simultaneously. In both PTSD and DID, hyper-arousal is often associated with increased vigilance but heightened affect and impaired performance (Forrest, 2001). Another possible consequence is a "freezing effect" discussed by Elsesser et. al. (2008). Wolf, Reinhard, Cozolino, Caldwell, and Asamen (2009) expand on the freezing effect in their study. When the freezing effect occurs, it is because of the release of endorphins. During chronic stress, the amygdale and the hypothalamus stimulate the periaquaductal gray matter, which is the main site for endogenous opiate production. The opiates react with norepinephrine and reduce sympathetic arousal, thus causing a freeze. This reaction starts when trauma occurs. When a fight or flight response is likely to hinder survival, the freeze response keeps fleeing or

fighting from happening. The endogenous opiates reduce psychological and physical pain, which explains why people with post traumatic stress disorder tend to have the symptoms of anhedonia, detachment and difficulty feeling emotions. High levels of endogenous opiates distort reality allowing for depersonalization; so even mild responses could cause the feeling of spacing out, trouble concentrating and loss of time. This would give the opposite result of the attention switching dissociation and lean more towards cognitive slippage. Severe trauma generally has the prolonged spacing and freezing effect; it is seen in Dissociative Identity Disorder when switching personalities (Forrest, 2001), and depersonalization disorders like dissociative amnesia and dissociative fugue (American Psychiatric Association, 2000). However, like mentioned before, Dissociative Identity Disorder also has hyper-vigilance as a symptom, so this assumption is not foolproof.

Even though there are conflicting studies, it is hypothesized that the reaction of the participants to the emotional stimuli will not be extreme enough to cause a freezing response. Instead, it is believed that hyper-vigilance will occur and response times will become quicker with higher scores on the DES.

Gender Differences

Gender differences on dependent measures will also be explored, although there is little relevant research using these measures on which to base directional predictions. One of the studies mentioning gender differences is by Miranda, Draijer, Langeland and Gersons (2007). In this study, gender differences in PTSD were analyzed via meta-analysis. It was found that females had a higher risk of peritraumatic dissociation and psychological dissociation. Males, on the other hand, tend to have a hyper-aroused state when presented with emotional and traumatic stimuli. As a result, females are more prone to dissociative disorders while males are more prone

to chronic disturbances as a result of hyper-arousal. The article also mentions that females pick up on threat related stimuli more readily than males. These differences are hypothesized to be due to the type of trauma experienced. Females are more prone to interpersonal violence and sexual violence. The study did not state which type of trauma males are more prone to; just that females are more prone to specific types than males. The different reactions to trauma as theorized by Miranda, Draijer, Langeland, and Gersons (2007) is illustrated in Figure (1).

In a study by Garcia-Garcia, Domínguez-Borrás, SanMiguel and Escera (2008), significant gender differences were discovered when participants were shown emotional stimuli. Fourteen males and fourteen females were exposed to stimuli and requested to perform an auditory-visual task. For females, when listening to novel sounds, response times increased after viewing negative emotional stimuli. For males, the response time did not increase. They concluded that there is stronger novelty processing in females than in males during threatening situations.

According to the literature, when examining gender differences in reaction times after viewing emotional stimuli, it seems that one should expect males to react quicker due to hyper-arousal, and females to react slower because they dissociate. However, due to the contradictory research about quick reaction times during dissociation, it was felt more research should be done on the topic.

Methods

Participants

Participants were chosen using the William and Mary SONA system. Each participant was from one of the introductory psychology courses, either Psychology 201 or Psychology 202 and were chosen based on answers to questions relating to magical thinking. Those who scored

1.5 standard deviations above or below the mean were selected. When viewing all answers to the mass testing questions, scores were normally distributed. One credit hour was awarded to those who completed the study. 93 students participated in the experiment. There were 62 females (67%) and 31 males (33%).

Items and Questionnaires

This study was performed predominantly on a computer. For the cognitive task, E-prime software was needed to measure the speed and precision of movement. A mouse was also needed, so that the movement would be as smooth as possible for the participant. The Emotional and Neutral stimuli for the study were also on the computer. The Emotional stimuli were paintings from a nationally recognized Canadian artist with schizophrenia, William Kurelek. The Neutral stimuli were pictures from the International Affective Picture Set. After the computer task, three questionnaires were provided.

The first questionnaire was the Dissociative Experiences Scale (DES), developed by Eve Carlson and Frank Putnam (1986). The DES is a twenty eight item self report scale which measures dissociative experiences such as depersonalization, amnesia, and imagination. The scale asks participants to rate how often experiences happen to them on a scale to 0% of the time (never) to 100% of the time (always). Total scores are determined by averaging all items (Waller, Putnam & Carlson, 1996). The DES has been deemed reliable and valid in a variety of research settings (Carlson & Putnam, 1993). The entire questionnaire is included in Appendix A.

The second questionnaire was the Creative Experiences Questionnaire (CEQ) created by Harald Merckelbach et.al. (1998). The CEQ is a twenty five item self report scale. It measures a subject's tendency for fantasy proneness with yes and no questions. Questions range from daydreaming to fantasizing with questions such as "I spend more than half the day daydreaming

or fantasizing" (Merckelbach, Muris, & Rassin, 1999). It has shown to be valid and reliable (Merckelbach, Horselenberg, & Muris, 2001). The questionnaire is included as Appendix B.

The third questionnaire was the Magical Ideation Scale (MIS) created by Mark Eckblad and Loren Chapman (1983). The MIS is a thirty item self report scale which has been shown to have high reliability and validity as a measure of schizotypy (Lenzenweger, Bennett, & Lilenfeld, 1997). The scale is a true and false scale and includes questions like: "Numbers like 13 and 7 have no special powers" and "Horoscopes are right too often for it to be a coincidence" (Eckblad & Chapman, 1983). This questionnaire is available in Appendix C.

All questionnaires were in the public domain.

Procedure

After filling out a consent form, explicit instructions were given concerning how to execute the cognitive task. Participants were asked to look at neutral pictures from the International Affective Picture Set and emotionally charged images from William Kurelek, a Canadian artist diagnosed with schizophrenia. These images included artistic renditions of abuse experienced by the artist, self mutilation, and mass destruction scenes. Examples of picture content, thought likely to elicit mild emotions, include a family eating dinner, with a starving monkey-like child with fur begging for scraps underneath the table, a child ripping off the skin of his arm with a knife revealing bone underneath, and a nuclear destruction scene with a lone baby carriage amidst the carnage and dead humans. These pictures, while emotionally stimulating, had been used in previous research at William & Mary without causing unusual distress. Examples of neutral pictures included photos of trains, clothes pins, and a lamp. Sixty pictures for each participant were chosen at random using a formula that gave a neutral picture around

60% chance of showing up after the last picture so that it would be slightly more likely than 50%. No picture was repeated.

Each picture stayed on the screen for 20 seconds. The picture then disappeared and the participant was instructed to write out a word association for that picture. This was to make sure that they were examining the pictures thoroughly so that there would be a possible emotional response. After the word association, the participant was asked by a cue on the computer screen to identify the shape or size of the two shapes in front of them on the screen. The answers were either same or different. The shapes varied in shape and size. An experiment schematic is included as Figure (2). The computer recorded each time that an identifying task, such as "shape" repeated, and labeled it "Stay" for purposes of data analysis. When a task was novel, it was labeled "Switch". When the participant decided whether the shapes or sizes were the same or different, they were instructed to move the mouse over to the correct answer. The possible answers were on separate sides of the computer screen. After the mouse reached an answer, the words correct or incorrect flashed on the screen depending on their answer. There was a trial period of approximately ten pictures before the actual task began. After the trial period ended, the participants were notified that the experiment would begin. When the task began, the computer program measured the accuracy, speed of response and efficiency of movement of stylus to target.

Performance was indexed by speed and accuracy of responses. The participant's total response time (RT) was split into (1) the time between the onset of the stimulus and the beginning of movement (AD) and (2) the time between the beginning and end of movement (AT), and all of these were measured by computer. These were measured separately, because some studies like Landauer, Armstrong, and Digwood (1980) found different cognitive

functioning between response times and movement delays between genders. They found that females had significantly faster decision times, while males had faster movement times. Landauer, Armstrong and Digwood (1980) believe that these differences may be because of faster decision processing times or stimulus identification in females.

After participants finished the cognitive response task, they were asked to fill out three questionnaires; the Dissociative Experiences Scale (Appendix A), the Creative Experiences Questionnaire measure of Fantasy Proneness (Appendix B) and the Magical Ideation subscale of the SPQ-B (Appendix C). After subjects completed the questionnaires and read the debriefing sheet, they were asked if they had any questions. When they finished their inquiries, their involvement with the experiment was finished.

Results

Results of t-test comparisons of the dependent variables following Emotional and Neutral pictures are reported below**.** Responses to Switch Neutral RT (M = 1215, SD = 274) and Emotional RT (M = 1228, SD = 297) were not significantly different (t (92) = -689, $p > .49$). Comparisons of Switch Neutral AD (M = 874, SD = 209) and Emotional AD (M = 896, SD = 244) were also non-significant, t (92) = -1.39, $p > .17$; as were Switch Neutral AT (M = 341, SD = 131) and Emotional AT (M = 347, SD = 151), t (92) = .890, $p > .38$. Stay Neutral AT (M = 340, SD = 136) and Emotional AT (M = 347, SD = 151) comparisons were also non-significant, t (92) = -.62, $p > .54$).

Comparisons of Stay Neutral AD (M = 817, SD = 187) and Stay Emotional AD (M = 845, SD = 297), t (92) = -1.98, $p < .05$ were marginally significant, as were Stay Neutral RT (M = 1158, SD = 256) and Emotional RT (M = 1192, SD = 308), t (92) = -2.00, $p < .05$. This means that there was a significant difference between the AD and RT response times while observing

the Emotional stimuli and the response times while observing the Neutral stimuli during the Stay tasks.

Linear regression was used to test for the effects of MI, CEQ and DES scale scores on differences between Switch and Stay Neutral and Emotional stimuli. Difference scores were calculated for all of the dependent variables (RT, AT, AD) by subtracting the Neutral stimuli response scores from the Emotional stimuli response scores. Results indicated that performance on the dependent measures (RT, AD, AT, to Emotional and Neutral stimuli) were not related to questionnaire scores. For AD Stay, the F value was .16, and non-significant. For AD Switch, the F value was .74, and non-significant. For RT, Stay (F = .78) and Switch (F = .77) were both non-significant. AT Switch was similarly non-significant (F = .42). One regression was marginally significant, the difference AT Stay score on the Magical Ideation Scale (F = 2.59, $p < .05$, Adjusted R Square = .05). The Standardized Beta coefficient was .23, $p < .07$. A correlation was also run between scores on the Magical Ideation Scale and the difference AT Stay scores, and a correlation of .27, n = 93 was found.

Gender differences between scales analyzed using ANOVA were non-significant (CEQ, F (91) = 1.24, $p > .27$; DES, F (91) = .92, $p > .34$; MIS, F (91) = .004, $p > .95$. Male and female difference scores were normally distributed and deemed suitable for analysis of variance (ANOVA). Gender scores for Stay Emotional and Neutral RT and AD were calculated. ANOVA was used to compare Gender groups on the difference scores. The results of the ANOVA showed that the difference scores when calculated for the response AD differed significantly for males: (Mean = -20.81, SD = 85.71); and females: (Mean of 51.42; SD = 146.66), this is depicted in Graph (1). Comparisons of Gender groups on the RT difference were non-significant. Results for Gender group comparisons on AD difference scores were significant, F (1, 92) = 6.40, $p = .01$.

These results indicate that males reacted more quickly to Emotional pictures and females reacted more slowly to Emotional pictures in comparison to responses to Neutral pictures. These differences are presented in Table (1).

In order to determine if the AD Gender differences were significant for the Stay or Switch trials, a multivariate ANOVA (MANOVA) was used with Gender as a fixed factor and AD Emotional, Neutral, Stay and Switch difference scores as dependent variables. Results indicated a significant overall effect for Gender (Wilks' Lambda, Value = .932, F= 3.28, $p <$ .05). ANOVA indicated the difference for AD Stay was significant (F= 6.402, $p < .05$) but the difference AD for Switch was non-significant (F= .116, $p > .50$). These results are shown in Table (2). This shows that the Gender difference found for AD is significant only for Stay trials, but not Switch trials.

To elaborate on the results found, the data was analyzed using a 2 (Emotion: Neutral, Emotional) X 2 (Switch: Stay, Switch) X 2 (Gender: Male, Female) mixed measures ANOVA. The main effect of Switch was significant for AD (F = 33.683, $p < .001$). There was a marginal significance between Gender and Switch AD (F = 2.887, $p < .09$). This shows a mild relationship between Gender groups and their AD reaction time on Switch tasks. The male Emotional mean was 787.470, as compared to the Neutral mean, 864.532. The female Emotional mean was 852.937, and the Neutral was 895.095. The interaction between Gender and Emotion for AD was also significant (F = 3.795, $p < .05$) indicating that males and females reacted differently when presented with Emotional stimuli. The male Emotional mean was 827.619 compared to the female Emotional mean, 854.701. The male Neutral mean was 824.382 and the female Neutral mean was 893.331. This shows that males react significantly faster when presented with emotional stimuli as compared to females. The Gender difference is shown in Figure (5). There

was also a significant Gender by Emotion interaction for AT ($F = 4.088$, $p < .05$) which is shown in Figure (6). Males, when presented with Emotional stimuli had an Action Time mean of 332.572 and when presented with Neutral stimuli had an AT mean of 350.510. Females, when presented with Emotional stimuli had an AT mean of 344.771 as compared to a Neutral stimuli mean of 333.852. This shows an interesting trend of males having a faster AT reaction to Emotional stimuli, but a slower one to neutral, and females having the opposite effect.

Discussion

This study, Associations to Visual Stimuli, was designed to test the hypothesis that response times, when exposed to Emotional as compared to Neutral pictures, would decrease for participants who scored high on the Dissociative Experiences Scale, the Creative Experiences Scale and the Magical Ideation Scale. These hypotheses were based on previous research and clinical observations indicating that tendencies toward dissociation, fantasy proneness, and creative thinking are associated with increased vulnerability to, and consequent cognitive disruption when negative emotions are triggered.

There was a marginal confirmation of the hypothesis, as evidenced by the regression performed between the difference AT Stay score and the Magical Ideation Scale. This showed that when the type of task did not differ, participants with high scores on the MIS performed slightly quicker on the time between the beginning and end of movement when shown emotional stimuli. However, this marginal change did not impact the total score, and was not true for AD and other scales. Since the significance is small, the experiment should be performed again with a larger sample size to confirm the results.

The Creative Experiences Questionnaire, the Magical Ideation Scale and the Dissociative Experiences Scale were all correlated. Since there was only a slight significance between

difference AT and the scores on the questionnaires, and no significance in total time, RT, and AD, the results support Bremner's (2010) research showing that dissociation is caused by more than just a heightened score the MIS or the CEQ.

A MANOVA indicated there were Gender group differences in responses to the pictures when all response types measured were analyzed together. ANOVA of separate dependent variables indicated that males responded more quickly to Emotional pictures on the AD measure and females more slowly, as compared to Neutral content pictures. In other words, females reacted more slowly to Emotional content pictures and males more quickly (Figure 1). Also, when running a mixed measure ANOVA, an interesting Gender difference occurred in which males have a faster Action Time to Emotional stimuli, but a slower one to Neutral. Females had the opposite effect, a faster Action time to Neutral stimuli and a slower one to Emotional.

There were no Gender differences on any of the questionnaire measures, however. This suggests that fantasy proneness and amount of dissociative experiences have no confounding effect on the discovered Gender differences in this study.

Limitations

As discussed in the introduction, there is no foolproof way to predict how dissociation will show itself. It could vary depending on person, or the severity of the trauma experienced. Since there were no questions were included in this study that asked if the person had been abused or had a traumatic event happen to them, these possibilities were not evaluated.

Another limitation is that the participants in the study were students. Scores from students were not generally extreme, so the data could be skewed in the less extreme direction. A follow-up study comparing these results with participants who scored high on the CEQ, the MIS and the DES would be beneficial to the literature.

It would have also been interesting to have analyzed the emotions that the pictures evoked. After each picture, a prompt was given to write the first word that the picture made you think of. If there was a Likert Scale asking the intensity of the emotions the picture evoked, perhaps the word association and the Likert Scale response would have revealed that females had a stronger reaction to the pictures, and thus took longer to process the emotions caused by the stimulus. These associations would provide an interesting insight into the Gender differences discovered.

Conclusions

The finding that fantasy proneness had only a mild impact on reaction times in this study has interesting ramifications for the debate about fantasy proneness and dissociation. It should spark more research in the area, since with more research it could either confirm that there is a relationship between the two, or it could disappear with more participants. There were Gender differences in reaction time during the study; however, fantasy proneness had no impact on the effects whatsoever. If fantasy proneness and dissociation were tightly entwined, as Giesbrecht suggests, it would be probable that there would have been something more than a marginal significance between questionnaire scores and the AT response time and a low correlation between the CEQ, the MIS and the DES.

The Gender differences found have implications. It means that there is a possibility that males and females process emotional information differently. When an emotional stimulus is presented, females either ponder it longer, have a mild dissociative response, or perhaps a freezing effect occurs, as discussed by Elsesser et. al. (2008). Males, on the other hand, react quicker when presented with emotional stimuli. Perhaps males react more instinctually to trauma, and have more dissociative processing associated with hyper-arousal, as noted by

Cardeña & Weiner (2004). The study by Miranda, Draijer, Langeland, & Gersons (2007) seems to explain the results of this study quite well. They state that females pick up on threatening stimuli more readily then males, and thus might have a stronger reaction to the emotional pictures shown in the study. Their findings also support the belief that males would react quicker because of hyper-arousal effects while females would have a higher propensity toward dissociation. This would account for why females had a longer response time to emotional stimuli, but were able to react quickly to neutral stimuli for the AT response time. On neutral slides, both genders would react normally, so that would explain why male neutral times increased while female neutral times decreased. These differences could be due to evolutionary adaptations in relation to trauma. Since males evolved in an environment in which they were the hunters and primary protectors, they would have to react quickly to a dangerous situation in order to survive and pass on their genes (Dawkins, 1989). Females, on the other hand, would have the time to think over what is best to do in that situation and make a plan. Thus, it is possible that males would have evolved to react quicker to trauma, while females would have evolved to think more cautiously about trauma. It is important to note that there are no value judgments associated with the possible evolutionary explanations.

Another possible explanation for the Gender differences could be due to the processing of emotions. The pictures shown during the study were very explicit and could trigger an intense negative emotional response in participants. Studies have shown that females and males respond to emotional stimuli differently. Yuan et. al. (2009) presented findings in which they demonstrated that females are more susceptible to negative stimuli. They measured event-related potentials for highly negative, moderately negative and neutral images as well as highly positive, moderately positive images. They found no gender differences in neutral or positive stimuli,

which could explain why gender differences were only found during emotional pictures in this study.

This study found different findings than Landauer, Armstrong, and Digwood (1980). Landauer, Armstrong, and Digwood (1980) found that females had faster decision times than males, and that males had faster movement times than females. In this study, males had faster decision times than females. The 1980 article explains that with less complicated cognitive tasks males tend to react faster. The article believes that females are faster with more complicated cognitive tasks. The reaction to emotional stimuli may be simple enough for males in this study to react faster than females.

According to studies, not only do females have stronger reactions to emotional stimuli, females have a tendency to remember emotional stimuli for longer (Bloise & Johnson, 2007). In the Bloise and Johnson (2007) study, males and females were asked to read a script that contained both emotional and neutral information. A surprise memory test was done after a writing task. The results showed that females recalled more emotional information than males did. There were no gender differences for the neutral information. The study also found that females tended to score higher on emotional sensitivity than males, and that may be why females remember the emotional material more.

Increased emotional awareness has been tied to post traumatic stress disorder. Those who are high in emotional awareness and clarity, tend to have heightened PTSD symptoms. Interestingly, his does not vary by gender (Bornovalova et. al., 2009). This may mean that if the study had questions on emotional awareness, or used the Emotional Awareness Scale (Lane et. al., 1990), it may have been discovered that the gender difference was in fact an emotional

awareness difference. Since females tend to report higher levels of emotional awareness than males, (Boden & Berenbaum, 2007) the results might show a very similar trend.

However, Carol Tavris (1992), a well known feminist writer, warns against believing gender differences in science. Females are told every day by society that they are supposed to be the ones aware of emotions; they are supposed to be the ones expressing more emotions. So, when asked about their emotional awareness, their empathy, or anything else involving emotions, females tend to rate themselves higher because they are told that they should (pg. 64). Tavris also states that females have to be able to judge emotional stimuli on a regular basis to compete with males, Tavris claims that the emotional differences are not a gender difference, they are a protective difference and that when the genders are on equal power levels, the differences disappear (pg. 65). An example of a study that supports Tavris' beliefs was done by Sonnby-Borgström, Jönsson, and Svensson (2008). The study showed both males and females angry, sad and happy facial features. On the subliminal and borderliminal exposure times, there were no gender differences in imitation or reported emotional reaction. However, on the supraliminal exposure time, females imitated and had a higher reported emotional reaction than males. This study shows that there is not an instinctual reaction to emotion for females. Another study that may demonstrate Tavris' beliefs shows that females rate emotional stimuli more negatively than males (Sharp, van Goozen & Goodyer, 2006). This could be because they genuinely do view stimuli as more distressing, or because society tells females that to be feminine they must rate emotional stimuli as negative.

However, contradicting the belief that emotional differences may be fully cultural is a study by Koch et. al. (2007). In this study, functional magnetic resonance imaging (fMRI) analysis was used to compare cognitive processing when exposed to emotional stimuli. fMRI

analysis showed significant gender differences in how the genders processed the emotion. When exposed to negative emotional stimuli, males had extended activation patterns in prefrontal, which is associated with executive functions such as memory and decision making, and superior parietal regions, which is concerned with the senses and attention. Females on the other hand, experienced more neutral activity in the amygdale, which is connected with emotional significance and emotional perception, and the orbitofrontal cortex, which controls associations between events and mood. The study concludes that female brains see emotional stimuli and activate emotion-associated areas in the brain, while male's brains connect negative emotional stimuli and areas related to cognitive control. However, it seems that while gender differences may be unaffected in brain function differences, a study shows that blood pressure and heart rate does not vary between the gender groups when viewing emotional stimuli (Sarlo et. al., 2005). For future studies, this experiment can be replicated with heart rate, blood pressure, and fMRI to study the biological effects.

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Figure 1

Miranda, O., Draijer, N., Langeland, W., & Gersons, B. (2007).

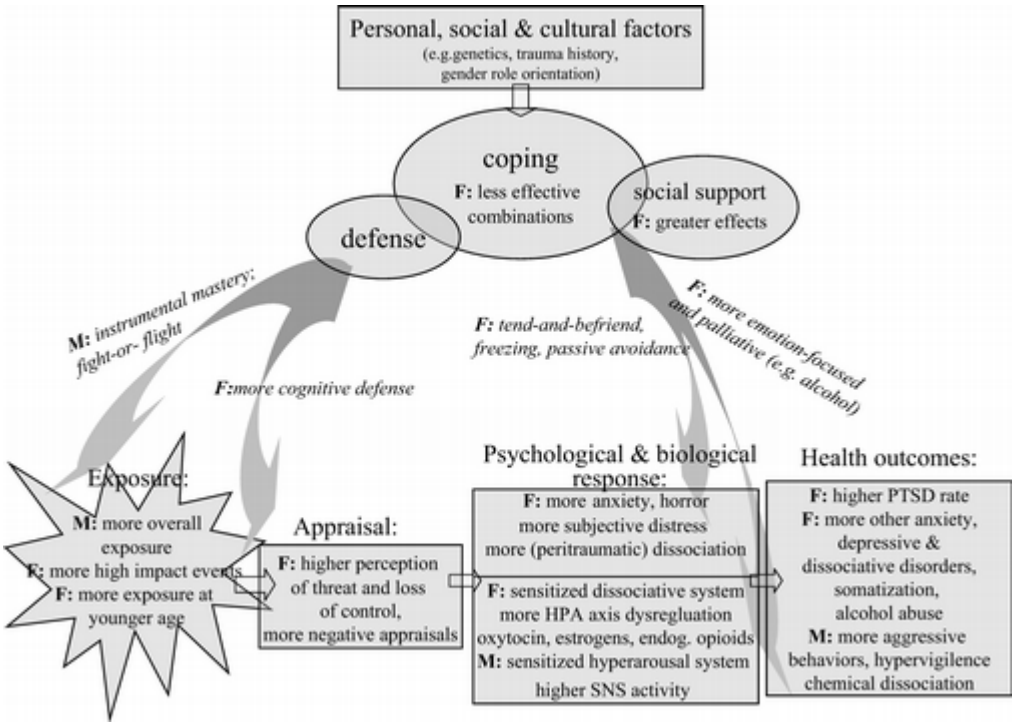


Figure 2. Gender-differentiated traumatic-stress-coping model. F = females; M = males; HPA = hypothalamic–pituitary–adrenocortical; endog = endogenous; SNS = sympathetic nervous system; PTSD = posttraumatic stress disorder.

Figure 2

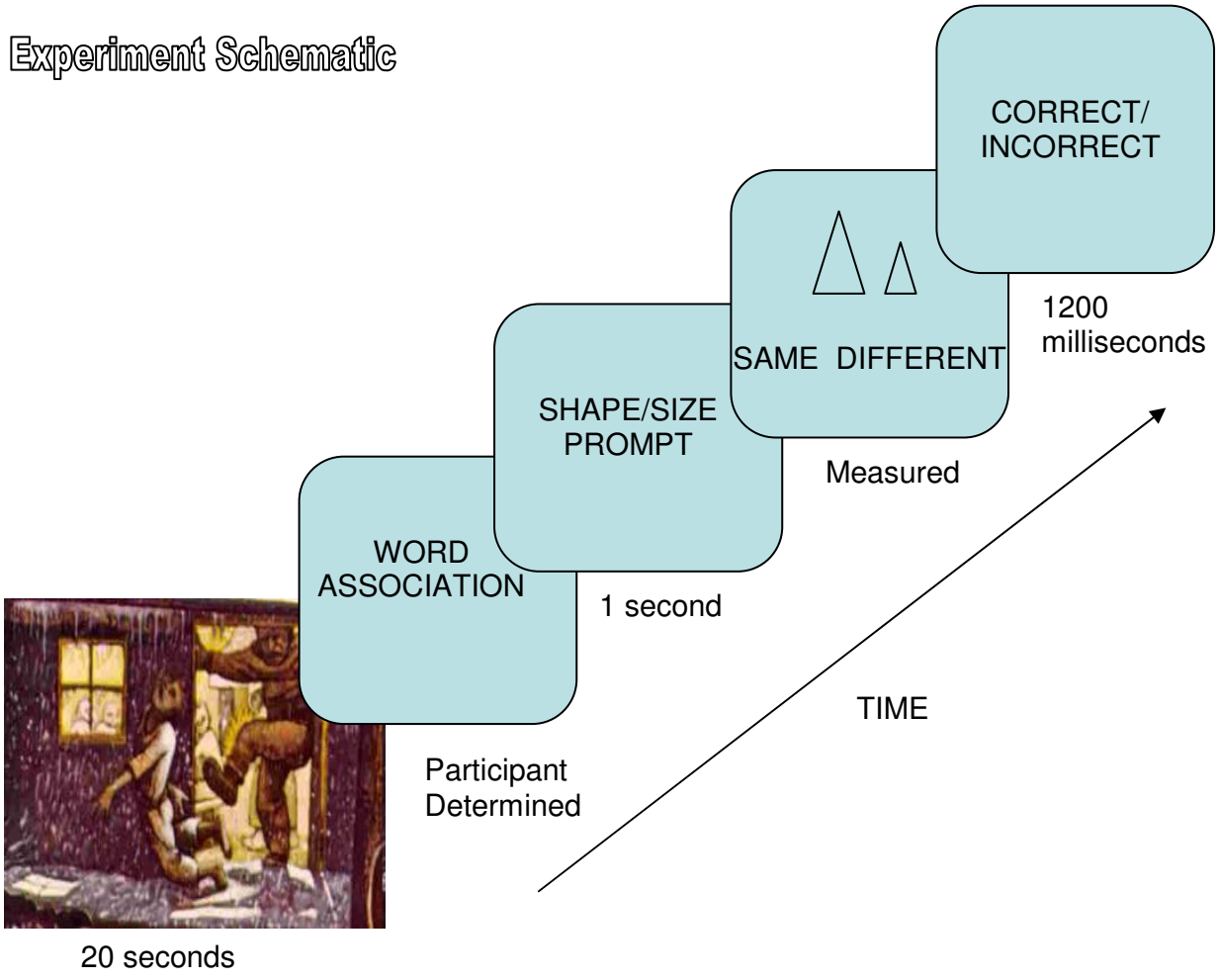
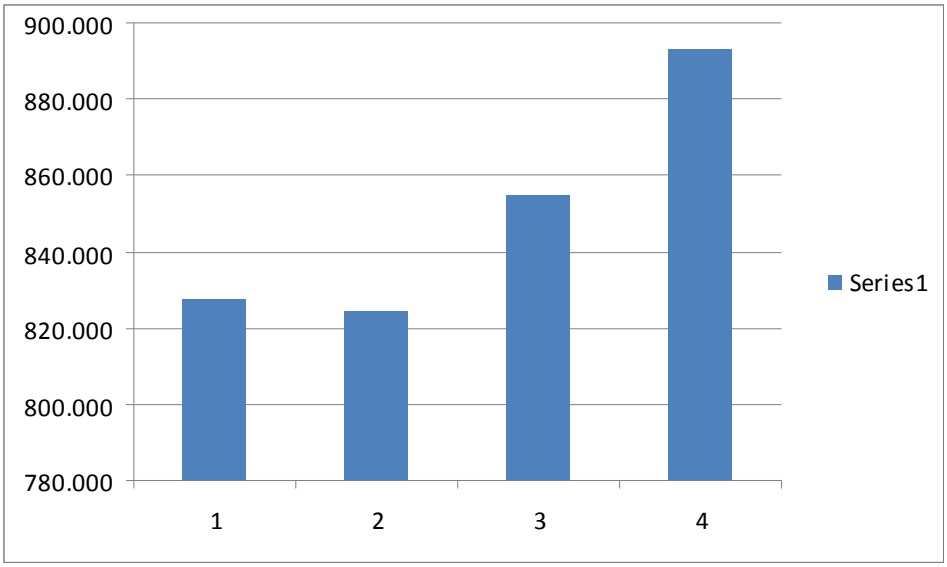

Experiment Schematic
CORRECT/
INCORRECT
SAME DIFFERENT
1200
milliseconds
SHAPE/SIZE
PROMPT
Measured
WORD
ASSOCIATION
1 second
TIME
Participant
Determined
20 seconds

Figure 3

6. Gender * Emotion Action Delay (AD)

Measure:MEASURE_1

Gender	Emotion	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	827.619	33.765	760.550	894.689
	2	824.382	40.614	743.708	905.057
2	1	854.701	23.875	807.276	902.126
	2	893.331	28.718	836.286	950.377



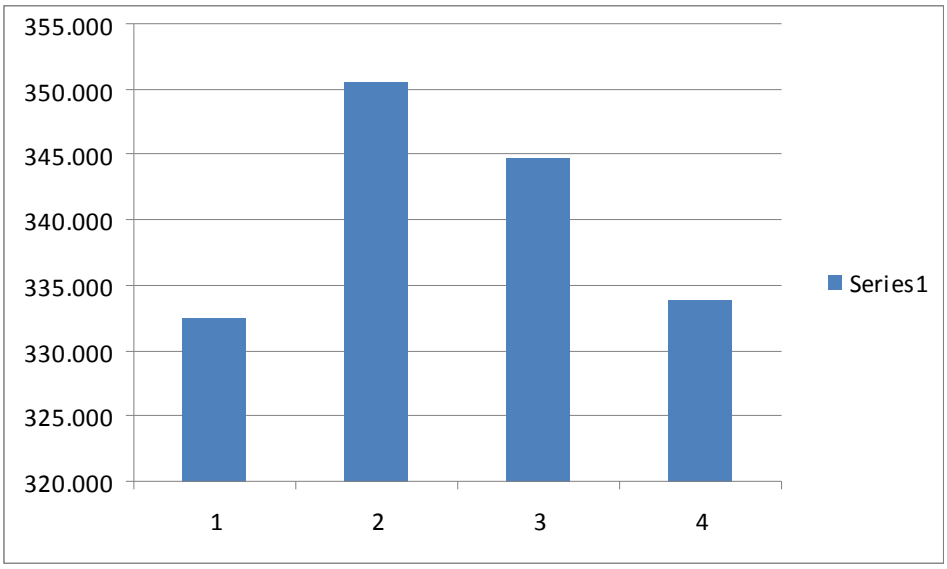
1 = Male Emotional, 2 = Male Neutral, 3 = Female Emotional, 4 = Female Neutral

Figure 4

6. Gender * Emotion Action Time (AT)

Measure:MEASURE_1

Gender	Emotion	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
1	1	332.572	22.239	288.397	376.747
	2	350.510	23.927	302.981	398.038
2	1	344.771	15.725	313.535	376.008
	2	333.852	16.919	300.245	367.460



1 = Male Emotional, 2 = Male Neutral, 3 = Female Emotional, 4 = Female Neutral

Table 1

Descriptive Statistics for gender and the difference between AD

	N	Mean	Std. Deviation
1	31	-20.8087	85.70742
2	62	51.4171	146.66274

ANOVA scores for gender and the difference between AD

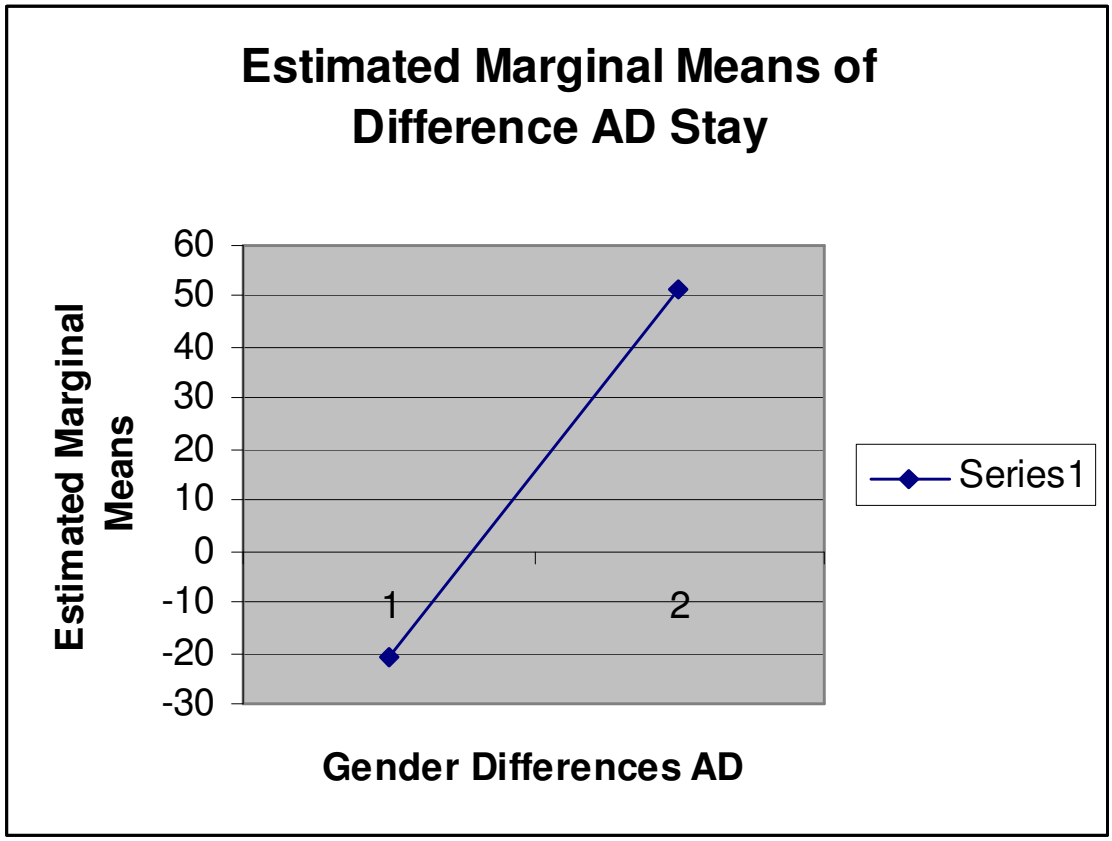
	Sum of Squares	df	Mean Square	F	Sig
Between Groups	107809.054	1	107809.054	6.402	.013
Within Groups	1532480.413	91	16840.444		
Total	1640289.467	92			

Table 2

Effect	Value	F	Sig
Gender			
Wilks' Lambda	.932	3.280	.042

Source	Dependent Variable	F	Sig
Gender	DifferenceADStay	6.402	.013
	DifferenceADSwitch	.116	.734

Graph (1)



1 = Male, 2 = Female

Appendix A

(Never) 0%----10----20----30----40----50----60----70----80----90----100% (Always)

1. _____Some people have the experience of driving or riding in a car or bus or subway and suddenly realizing that they don't remember what has happened during all or part of the trip. Indicate what percentage of the time this happens to you.
2. _____Some people find that sometimes they are listening to someone talk and they suddenly realize that they did not hear part or all of what was said. Indicate what percentage of the time this happens to you.
3. _____Some people have the experience of finding themselves in a place and having no idea how they got there. Indicate what percentage of the time this happens to you.
4. _____Some people have the experience of finding themselves dressed in clothes that they don't remember buying. Indicate what percentage of the time this happens to you.
5. _____Some people have the experience of finding new things among their belongings that they do not remember buying. Indicate what percentage of the time this happens to you.
6. _____Some people sometimes find that they are approached by people that they do not know who call them by another name or insist that they have met them before. Indicate what percentage of the time this happens to you.
7. _____Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something and they actually see themselves as if they were looking at another person. Indicate what percentage of the time this happens to you.
8. _____Some people are told that they sometimes do not recognize friends or family members. Indicate what percentage of the time this happens to you.
9. _____Some people find that they have no memory for some important events in their lives (for example, a wedding or graduation). Indicate what percentage of the time this happens to you.
10. _____Some people have the experience of being accused of lying when they do not think that they have lied. Indicate what percentage of the time this happens to you.
11. _____Some people have the experience of looking in a mirror and not recognizing themselves. Indicate what percentage of the time this happens to you.
12. _____Some people have the experience of feeling that other people, objects, and the world around them are not real. Indicate what percentage of the time this happens to you.
13. _____Some people sometimes have the experience of feeling that their body does not seem to belong to them. Indicate what percentage of the time this happens to you.
14. _____Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event. Indicate what percentage of the time this happens to you.
15. _____Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Indicate what percentage of the time this happens to you.
16. _____Some people have the experience of being in a familiar place but finding it strange and unfamiliar. Indicate what percentage of the time this happens to you.
17. _____Some people find that when they are watching television or a movie they become so absorbed in the story that they are unaware of other events happening around them. Indicate what percentage of the time this happens to you.

18. _____Some people sometimes find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Indicate what percentage of the time this happens to you.
19. _____Some people find that they sometimes are able to ignore pain. Indicate what percentage of the time this happens to you.
20. _____Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Indicate what percentage of the time this happens to you.
21. _____Some people sometimes find that when they are alone they talk out loud to themselves. Indicate what percentage of the time this happens to you.
22. _____Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were two different people. Indicate what percentage of the time this happens to you.
23. _____Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc.). Indicate what percentage of the time this happens to you.
24. _____Some people sometimes find that they cannot remember whether they have done something or have just thought about doing that thing (for example, not knowing whether they have just mailed a letter or have just thought about mailing it). Indicate what percentage of the time this happens to you.
25. _____Some people find evidence that they have done things that they do not remember doing. Indicate what percentage of the time this happens to you.
26. _____Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Indicate what percentage of the time this happens to you.
27. _____Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Indicate what percentage of the time this happens to you.
28. _____Some people sometimes feel as if they are looking at the world through a fog so that people and objects appear far away or unclear. Indicate what percentage of the time this happens to you.

Appendix B

(True/False)

1. As a child I thought the dolls & teddy bears and stuffed animals I played with were living creatures. __
2. As a child I strongly believed in the existence of dwarfs, elves, and other fairy tale figures.__
3. As a child I had my own make believe friend.__
4. As a child I could easily identify with the main character of a story and/or a movie.__
5. As a child I sometimes had the feeling that I was someone else (e.g., a princess, an orphan)__
6. As a child, I was encouraged by adults (parents, grandparents, brothers, sisters) to fully indulge myself in my fantasies and daydreams.__
7. As a child, I often felt lonely.__
8. As a child, I devoted my time to playing a musical instrument, dancing, acting and/or drawing.__
9. I spend more than half the day daydreaming or fantasizing.__
10. Many of my friends and/or relatives do not know I have such detailed fantasies.__
11. Many of my fantasies have a realistic intensity.__
12. Many of my fantasies are almost as lively as a good movie.__
13. I sometimes confuse fantasies with real memories.__
14. I am never bored because I can start fantasizing when things get boring.__
15. Sometimes I act like someone else and I identify myself with that role.__
16. When I recall my childhood, I have very vivid and lively memories.__
17. I can recall many occurrences before the age of three.__
18. When I see violence of TV, I get so into it that I get really upset.__
19. When I think of something cold, I can actually get cold.__
20. If I imagined I ate rotten food, I could get really nauseous.__
21. I often have the feeling that I can predict things that are going to happen in the future.__
22. I often have the experience of thinking of someone and soon afterwards that person calls or shows up.__
23. I sometimes feel that I am outside observing myself.__
24. When I sing or write something, I sometimes have the feeling that someone or something outside of myself is directing me.__
25. During my life, I have had intense religious experiences which influenced me in a very strong manner.__

Appendix C

(True/False)

1. I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to him/her.__
2. Things sometimes seem to be in different places when I get home, even though no one has been there.__
3. I have never doubted that my dreams are the products of my own mind.__
4. I have had the momentary feeling that someone's place has been taken by a look alike.__
5. I have never had the feeling that certain thoughts of mine really belonged to someone else.__
6. At times I have wondered if spirits of the dead can really influence the living.__
7. On occasion I have performed little rituals to ward off negative influences.__
8. I have sometimes worried that I might cause something to happen by thinking about it too much.__
9. There have been times when I felt a professor's lecture was meant especially for me.__
10. I have sometimes felt that certain strangers could read my thoughts.__
11. If reincarnation were true it would explain some experiences I have had.__
12. I sometimes have the feeling of gaining or losing energy when certain people touch me or look at me a certain way.__
13. It is not possible to harm others merely by thinking bad thoughts about them.__
14. I have sometimes had the feeling that there was an evil presence around me.__
15. People sometimes behave so strangely that I wonder if they are part of an experiment. __
16. The government has refused to tell the truth about flying saucers. __
17. I almost never dream about things before they happen.__
18. I have sometimes had the passing thought that a stranger I see is strongly attracted to me.__
19. The hand motions that strangers make seem to influence me at times.
20. Good luck charms don't work.__
21. I have sometimes been fearful of stepping on sidewalk cracks.__
22. Numbers like 13 and 7 have no special impact. __
23. I think I could read other people's thoughts if I really wanted to.__
24. Horoscopes are right too often to be coincidences. __
25. Sometimes people can make me aware of them just by thinking about me. __
26. I believe people on other planets in the Universe are aware of what is going on here on Earth.__
27. When introduced to strangers I rarely wonder if I have known them before.__
28. I have noticed sounds on my CDs that I hadn't noticed before.__
29. I have had the momentary feeling that someone's place had been taken by a look alike.__
30. I have been as candid and honest about my experiences as possible when answering these questions.___